substrate during the heat treating step." Independent claim 12 includes the limitation of "wherein the substrate surface is cold worked to a degree sufficient to allow grains nucleating in the second material to grow into the substrate surface during the heating step." Burke teaches away from these limitations at column 12, lines 52-57 where he states "Such ground surfaces do not contain sufficient stored plastic work to cause recrystallization in the near surface region. When these surfaces are heat treated, the surfaces do not recrystallize. Particularly, when the bonding material is melted over the worked surface, recrystallization is inhibited." Even the Abstract of Burke describes "machining the mating surfaces of the separate parts in a controlled manner to avoid recrystallization of the material." Thus, Burke fails to support the rejections of the independent claims under 35 USC 102 or 103.

Second, the claim rejections under 35 USC 102 are improper because Burke fails to disclose every limitation recited in the claims. MPEP §2131 provides that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. The identical invention must be shown in as complete detail as contained in the claim. The elements must be arranged as required by the claim. Independent claim 1 includes the limitation of "bond line grains having a size exceeding a thickness of the molten region." Independent claim 10 includes the limitation of "to cause the joint grains to recrystallize and grow into the substrate." Independent claim 12 includes the limitation of "to allow grains nucleating in the second material to grow into the substrate surface." Burke lacks any such teaching, and therefore fails to support the rejections of these independent claims under 35 USC 102. To the contrary, Burke states at column 11, lines 63-64 that "the resolidification process occurs as single crystal growth from the base material." This means that the process of Burke is the admitted prior art process illustrated in FIG. 1 of the present application. Burke lacks any description of grain growth from the molten region into the substrate, as illustrated in FIG. 3 of the present application and as delineated by the above-quoted claim language. Thus, Burke fails to support the rejections of the independent claims under 35 USC 102.

Third, the Burke reference is non-enabling for the present invention. As held in *Paperless Accounting, Inc. v. Bay Area Rapid Transit Systems,* 231 USPQ 649, 653 (Fed. Cir. 1986), "[A] §102(b) reference must sufficiently describe the claimed invention to have placed the public in possession of it... [E]ven if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling..." Burke clearly emphasizes surface preparation processes that impart a low level of stress into the substrate surface, for example, low stress grinding or electro-discharge machining (column 11 lines 40-41). Burke makes no mention of purposefully imparting an elevated degree of stress into the substrate, and he makes no mention of causing grains that have originated in the melt region to grow into the substrate to a size that exceeds the thickness (T) of the melt zone. To the contrary, Burke teaches just the opposite. Thus, Burke is not enabling for the present invention and does not support the rejections under 35 USC 102 or 103.

With regard to the specific rejection of dependent claim 3 under 35 USC 103(a) as obvious over Burke, the Applicants find the Examiner's argument to be illogical and without technical merit. The Examiner argues that, if the two substrates being joined were to have a different chemistry and microstructure, it would be obvious to cold work the two surfaces to a different degree "in order to produce the similar chemistry and microstructure in the bond zone that exists in the bulk of the substrate materials." However, it is well known in the art that cold working does not change chemistry. Thus, the Examiner's argument is technically incorrect with regard to chemistry. Furthermore, if the two substrates have different microstructures, it is logically impossible for the bond zone to have a microstructure that is similar to the two different microstructures, since it can only match one or the other or neither. Thus, the Examiner's argument is logically incorrect with regard to microstructure. Accordingly, the Examiner has provided no basis for modifying the teaching of Burke to add the limitations of claim 3, and the Burke reference standing alone fails to support the rejection of claim 3 under 35 USC 103.

With regard to the specific rejection of dependent claim 4 under 35 USC 103(a) as obvious over Burke, the Applicants find the Examiner's argument fails to provide a *prima facie* basis for the rejection. Claim 4 includes the limitation of "imparting an

uneven pattern of cold working stress into the surface." This facilitates the growth of grains as illustrated in FIG. 6 of the present application. The Examiner relies on the description of shot peening in Stenard to reject this claim. However, while Stenard does describe shot peening, he does not describe shot peening of any single surface to produce a varying pattern of stress. To the contrary, Stenard describes selecting preferred parameters, then automating the process to rotate the article while the shot peen nozzle is traversed normal to the surface to cover the entire surface (column 2, lines 18-42). This would result in a very even shot peening effect, as would be desired by Stenard, since he controls the process carefully so that it breaks fibers near the surface but does not damage underlying fibers. Thus, when the surface machining process of Burke is modified to include the shot peening process of Stenard, the combination contains no teaching or suggestion of the above quoted limitations of claim 4, and the rejection of the claim under 25 USC 103 is without support.

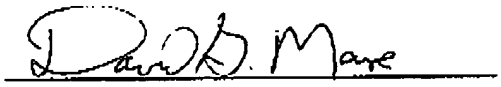
With regard to the specific rejection of dependent claims 7-9 as being obvious over Burke, the Applicants note that the Examiner's argument proves only that the foil and some of the base metal will melt in the process of Burke, which equates to the thickness T as described in the present application. The Examiner then jumps to the unsupported conclusion that this fact makes it obvious to cold work the substrate so that the grains grow into the substrate to at least two to four times the thickness of the molten region (2T to 4T). However, there is no suggestion in Burke to cold work the surface in this manner - in fact, Burke urges just the obvious by specifying only low stress processes. Burke takes careful measure to avoid the growth of grains from the molten region, since he hopes to accomplish only the growth of grains from the substrate into the molten region (as illustrated in FIG. 1 of the present application) in order to preserve the single crystal structure of the component. Thus, Burke actually teaches away from the conclusion drawn by the Examiner and does not support the rejection of claims 7-9 under 35 USC 103.

With regard to the specific rejection of dependent claim 11 as being anticipated by Burke, claim 11 includes the limitation that "the joint grains grow into the substrate to a size greater than a thickness of a molten region existing during the transient liquid phase bonding process." As acknowledged by the Examiner, Burke teaches only that

the bond foil and a similar thickness of the base metal would melt - this is the thickness T described in the present invention. Claim 11 delineates grains that are larger than T, thus Burke fails to support the rejection of claim 11 under 35 USC 102.

Reconsideration of the application in light of the above Remarks and allowance of claims 1-18, 25 and 26 are respectfully requested.

Respectfully submitted,



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